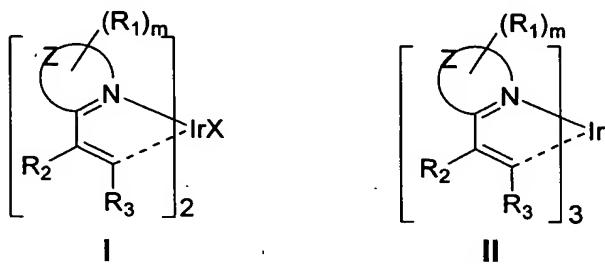


Claim:

1. An organic light emitting diode (OLED) comprising: an anode on a substrate, an electroluminescent medium on said anode, and a cathode on said electroluminescent medium, characterized in that said electroluminescent medium comprises a light emitting layer comprising a phosphorescent Ir complex having the following structures (I) or (II):

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wherein X is an arbitrary monoanionic bidentate ligand;

Z is an arbitrary atomic moiety capable of forming a nitrogen-containing 10 heterocyclic group;

R₁ is selected from the group consisting of H, halogen, C1-C6 alkyl, halogen-substituted C1-C6 alkyl, C1-C6 alkoxy, phenyl C1-C6 alkyl, amino, and aryl;

m is 0 or any positive integer determined by the ring size of said 15 nitrogen-containing heterocyclic group;

R₂ and R₃ independently are selected from the group consisting of H, halogen, C1-C6 alkyl, halogen-substituted C1-C6 alkyl, C1-C6 alkoxy, phenyl C1-C6 alkyl, amino, aryl, and heterocyclic aryl.

20 2. The OLED as claimed in Claim 1, wherein said aryl is phenyl, naphthyl, diphenyl, anthryl, pyrenyl, or phenanthryl; said heterocyclic aryl is benzofurane or thiophene.

25 3. The OLED as claimed in Claim 1, wherein said nitrogen-containing heterocyclic group is pyridine, quinoline, isoquinoline, pyrazine, pyrimidine, pyrrole, pyrazole, imidazole, indole, thiazole, isothiazole, oxazole, isoxazole, benzothiazole, benzoxazole, or phenanthroline.

4. The OLED as claimed in Claim 1, wherein R₂ is H or methyl; and R₃ is C1-C6 alkyl or aryl group.

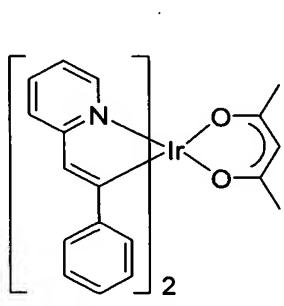
5. The OLED as claimed in Claim 4 wherein R₃ is methyl, phenyl or naphthyl.

6. The OLED as claimed in Claim 1, wherein X is acetylacetone, aminoacid, salicylaldehyde, or iminoacetonate.

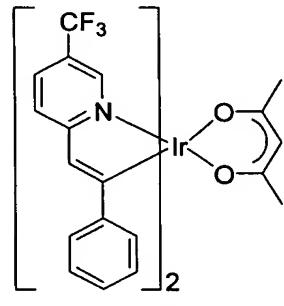
7. The OLED as claimed in Claim 6, wherein X is acetylacetone.

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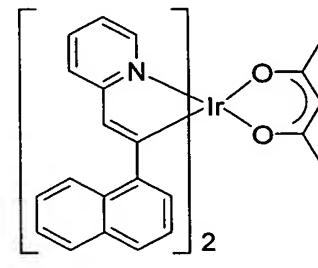
8. The OLED as claimed in Claim 1, wherein said phosphorescent Ir complex is



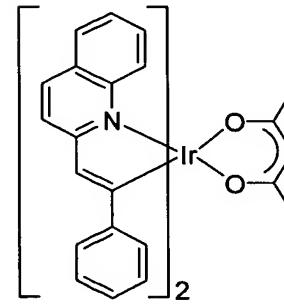
I-1



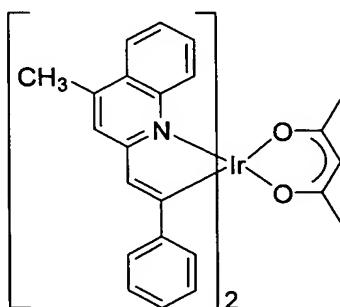
I-2



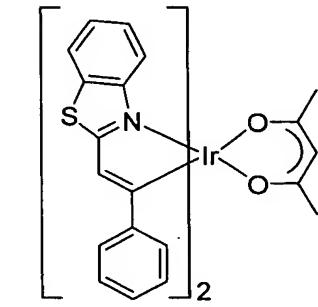
I-3



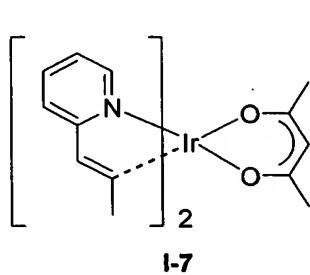
I-4



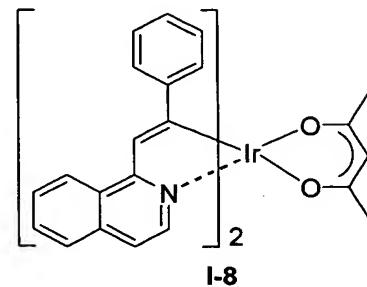
I-5



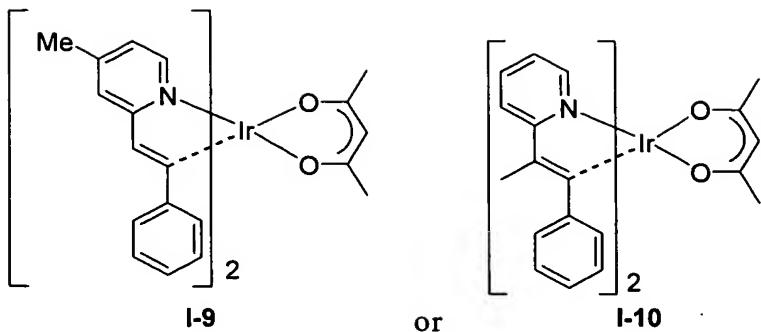
I-6



I-7



I-8



9. The OLED as claimed in Claim 1, wherein said light emitting layer will emit yellow to red light, when a voltage is applied on said anode and said cathode.

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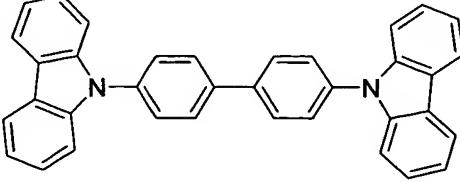
10. The OLED as claimed in Claim 1, wherein said light emitting layer further comprises a host compound, and said Ir complex is doped into said host compound.

10 11. The OLED as claimed in Claim 10, wherein said host compound is a compound having a hole transporting capability.

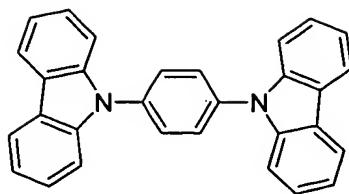
12. The OLED as claimed in Claim 10, wherein said host compound is a compound having an electron transporting capability.

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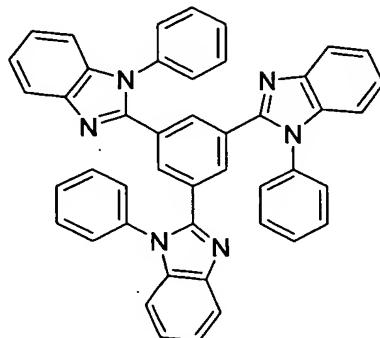
13. The OLED as claimed in Claim 11, wherein said compound having a hole transporting capability is:



20 14. The OLED as claimed in Claim 11, wherein said compound having a hole transporting capability is:



15. The OLED as claimed in Claim 12, wherein said compound having an electron transporting capability is:

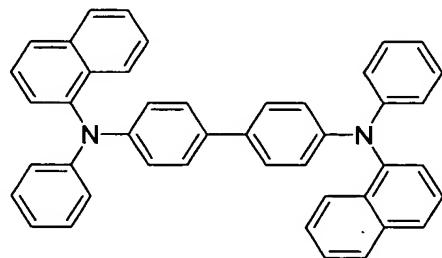


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16. The OLED as claimed in Claim 1, wherein said electroluminescent medium further comprises a hole transporting layer between said anode and said light emitting layer.

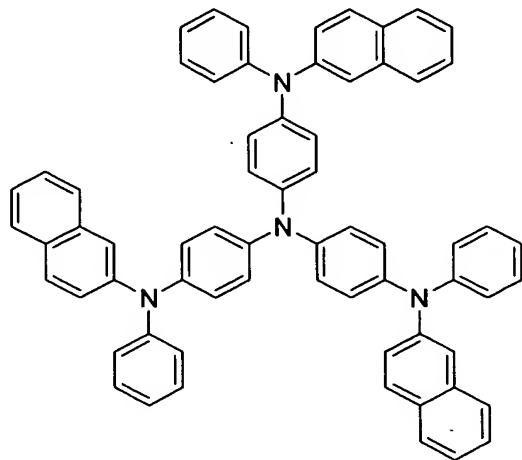
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17. The OLED as claimed in Claim 16, wherein said hole transporting layer comprises a compound of the following structure:



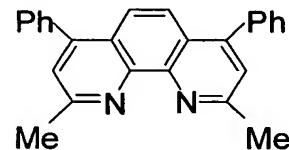
15 18. The OLED as claimed in Claim 16, wherein said electroluminescent medium further comprises a hole injection modification layer between said anode and said hole transporting layer.

19. The OLED as claimed in Claim 18, wherein said hole injection modification layer comprises a compound of the following structure:



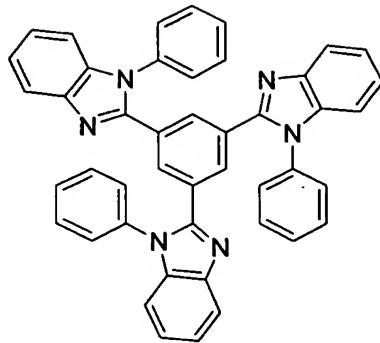
5 20. The OLED as claimed in Claim 1, wherein said electroluminescent medium further comprises a hole-blocking layer between said cathode and said light emitting layer, and said hole-blocking layer contacts said light emitting layer.

10 21. The OLED as claimed in Claim 20, wherein said hole-blocking layer comprises a compound of the following structure:

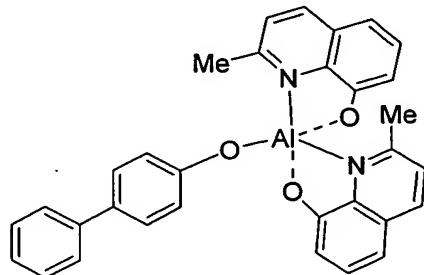


wherein Ph is phenyl, and Me is methyl.

15 22. The OLED as claimed in Claim 20, wherein said hole-blocking layer comprises a compound of the following structure:



23. The OLED as claimed in Claim 20, wherein said hole-blocking layer comprises a compound of the following structure:

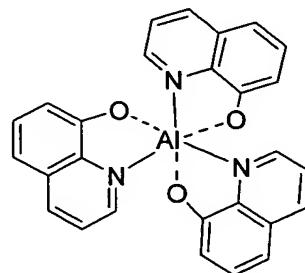


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wherein Me is methyl.

24. The OLED as claimed in Claim 20, wherein said electroluminescent medium further comprises an electron transporting layer between said hole-blocking layer and said cathode.

10 25. The OLED as claimed in Claim 24, wherein said electron transporting layer comprises a compound of the following structure:



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